



# ICAO ENGINE nvPM EMISSIONS DATA SHEET

## SUBSONIC ENGINES

ENGINE IDENTIFICATION: AE3007A1P BYPASS RATIO (-): 4.8  
 UNIQUE ID NUMBER: 01P06AL031 PRESSURE RATIO  $\pi_{co}$  (-): 17.7  
 COMBUSTOR: Type 3 (reduced emissions)  
 ENGINE TYPE: MTF RATED OUTPUT  $F_{co}$  (kN): 35.0

### REGULATORY DATA

CHARACTERISTIC VALUES:	$LTO_{mass}/F_{co}$ (mg/kN)	$LTO_{num}/F_{co}$ (particles/kN)	NVPM MASS CONCENTRATION ( $\mu\text{g}/\text{m}^3$ )
LTO/ $F_{co}$ AND MAX nvPM <sub>mass</sub>	155.2	3.05E+15	260
AS % OF CAEP/10 LIMIT	-	-	2.1
AS % OF CAEP/11 LIMIT (InP)	4.0	13.4	
AS % OF CAEP/11 LIMIT (NT)	15.4	25.3	

### MEASURED DATA

MODE	POWER SETTING (% $F_{co}$ )	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK nvPM <sub>mass</sub> ( $\mu\text{g}/\text{m}^3$ )
				EI <sub>mass</sub> (mg/kg)	EI <sub>num</sub> (particles/kg)	
TAKE-OFF	100	0.7	0.386	43.1	2.83E+14	
CLIMB OUT	85	2.2	0.324	34.9	3.09E+14	
APPROACH	30	4.0	0.119	9.8	3.26E+14	
IDLE	7	26.0	0.050	18.4	6.38E+14	
LTO TOTAL (kg, mg, number of particles)			165	3908	7.69E+16	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/ $F_{co}$ VALUES (mg/kN, particles/kN)				111.6	2.20E+15	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ( $\mu\text{g}/\text{m}^3$ )				43.1	6.38E+14	202

\* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

### DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

MODE	POWER SETTING (% $F_{co}$ )	CORRECTED EMISSIONS INDICES	
		EI <sub>mass_SL</sub> (mg/kg)	EI <sub>num_SL</sub> (particles/kg)
TAKE-OFF	100	48.3	6.75E+14
CLIMB OUT	85	39.8	7.96E+14
APPROACH	30	12.7	1.24E+15
IDLE	7	25.7	2.48E+15

### AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	98.8	99.9	HEAT OF COMBUSTION (MJ/kg)	43.20
TEMPERATURE (K)	272.8	283.2	HYDROGEN CONTENT (%mass)	13.69
HUMIDITY (kg water/kg dry air)	0.0018	0.0067	AROMATICS CONTENT (%vol)	16.2
			NAPHTHALENE CONTENT(%vol)	0.42
			SULPHUR CONTENT (ppm by mass)	81

MANUFACTURER: Rolls-Royce Corporation  
 TEST ORGANIZATION: MS&T  
 TEST LOCATION: Indianapolis  
 TEST DATES: 23/03/2015-25/03/2015

### REMARKS

1. Certification Report EDNS04000123846